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# How Do Agricultural Development Benefits Actually Spread: Is it the Trickle Down Effect or the Embudo Effect?

**By**

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## Abstract

It is always assumed that agricultural development impacts are spread across individuals, groups, and countries through the so called trickle down effect, the process that ensures that agricultural development benefits are shared top down by all participants. However, despite constant improvements in agricultural technology and knowledge over the last 50 years this expectation has not been materialized. Instead, the evidence shows a dual process at work: economic agents have benefit a lot(More wealth was generated and went to the few rich) and social and environmental agents have suffered a lot(Poverty and environmental degradation have increased). And this disconnect between the historical trickle down expectation and actual development impacts on the ground raises the question, if it is not the trickle down effect that is at work, then how have agricultural development impacts actually been and are being spread?.

The goals of this paper are to introduce an agricultural development model that is driven by what the author calls the Embudo effect; to point out that under inequalities, the Embudo effect drives agricultural development benefits towards those better off; and to stress that only in the absence of the Embudo effect would the historically assumed trickle down effect work as expected and provide benefits to all involved including the poor.

## Introduction

### The theory vrs the practice behind the traditional agricultural development model

In general, it can be said that the efficient working of the traditional agricultural economic model rest on three fundamental tenets: the equality assumption, the trickle down assumption; and wellbeing of the majority assumption. Based on the agricultural development experience of the last

50 years a short overview of the theoretical and practical bases behind of each of these tenets is provided below:

### *a) Theory versus practice: The equality assumption*

In theory, it is assumed that economies work in environments where equality in access prevails and that economies are organized in a way that allow resources(income, land, and other natural assets), inputs(capital, labour, and technology), and markets(local, regional, national, and global) to be used fairly and efficiently. In other words, it is assumed that everybody has equal access; and therefore who controls access in these economies does not matter.

In practice, it is a fact that access to resources, inputs, and markets was and continues to be unequal. Addison and Cornia(2001) point out that in the last 20 years inequality has continued to rise negatively affecting poverty reduction efforts. Therefore, the agricultural development model was and it is being implemented in an environment of deep inequality. Under inequality, contrary to expectations under equality, who controls access does matter as benefits will tend to accrue to them. This makes inequality one of the key factors between growth expectations and poverty. For example, Nissanke and Thorbecke(2007) point out that one of the links between globalization and poverty is inequality. It is known that the higher the inequality the lower the effectiveness of higher growth in reducing poverty(Cord 2007).

### *b) Theory versus practice: The trickle down assumption*

The equality assumption is linked to the trickle down assumption by the theory. The equality assumption ensures the working of the trickle down assumption, which relates to the expectations that benefits from implementing the agricultural development model and from newly emerging agricultural technologies will trickle down and benefits wide segments of the population from top to bottom. The expectation within the traditional economic model that growth in itself will sooner or later lead to better income positions for all rich and poor is well-known(Dohlman and Soderback 2007). Toussaint(2006) describes the trickle-down effect as a simple metaphor by which development organizations like the World Bank expect the income position of the poor to improve the more the income position of the rich improves.

In practice, it is well-documented that the trickle down effect has spread benefits unequally as a result of having been implemented in an environment of inequalities; and therefore the expected fair trickle down effect has not worked. It is a fact, some have benefited more than others from this trickle down effect confirming the proposition that under inequality those who control access actually benefit the most from the trickle down effect. Nissanke and Thorbecke(2007) indicate that the expectation that globalization would lead to improvements in poverty reduction and income distribution have not materialised; and that based on the way globalization has gone so far, the concern that it has had a negative impact on poverty and income distribution can not be dismissed. The trickle down effect has not been working in developed countries too. Lewis(2007) points out that in the UK and in all others developed countries including the United States income inequalities have worsen in the past 25 years. Frank(2007) points out that the trickle down theory continues to be used today despite well documented practical and theoretical weaknesses. No wonder why countries like India and China are now trying to

stay away from these trickle-down expectation and seek more direct approaches to break the rich-poor imbalance through massive investments in education, health, employment, and development programs(Crane 2007).

### *c) Theory versus practice: The well-being of the majority assumption*

The trickle down assumption is tied to the well-being of the majority assumption by the theory too. It is assumed that the trickle down effect is the best distributive mechanism within the traditional market to ensure the channeling of benefits across social groups. In other words, improving the well-being of the majority through the fair spread of economic growth is the desired outcome of the trickle down effect and therefore, of the agricultural development model. Hence, as economic growth takes place, growth in the well-being of the majority is expected as social welfare is expected to improve. In summary, it is assumed that the agricultural development model is implemented in an environment where equality in access exist and therefore, the benefits of economic growth are distributed fairly through the trickle down effect ensuring that way ongoing improvements in the well-being of the majority or society as a whole.

In practice, the evidence shows that the rich are getting richer(the powerful getting more powerful) and the poor is getting poorer(the weak getting weaker). And it is a fact, that few control access to resources, inputs, and markets; and those few are the ones receiving a stronger trickle down effect. The fact that equity issues in terms of rich and poor have worsen through the years and that this imbalance was made relevant with its inclusion in the millennium development goals(MDGs) was stressed by Wolfensohn(2004). In other words, the reality shows that the traditional agricultural economic model is a good fit to meet the well-being of the minority, not the well-being of the majority as theoretically assumed. WB(2000) points out that there is a feeling that globalization is negatively affecting inequality that works against the poor perhaps fuelled by the fact that the number of poor people in absolute terms has not declined.

On the other hand, implementing the agricultural development model under inequality has led to a sort of tri-modal growth: growth in opulence, growth in poverty, and growth in environmental degradation. Hence, economic growth has taken place, the welfare of the few or the better off segments of society has grown, while growth in the well-being of the poor has not taken place, contradicting initial expectations. For example, the expectations that ongoing and incremental improvements in agricultural development technologies in the past 50 years were going to benefit everybody in the agricultural sector fairly have not materialized while poverty and hunger have increased. WB(2000) stresses that the main challenge of globalization right now continues to be poverty reduction. And this situation seems to be behind the current International Assessment of Agricultural Science and Technology(IAASTD 2004), a process that is geared a) to re-evaluate the working of the traditional agricultural development model under the expected working of the trickle down effect; and b) to suggest possible ways forward consistent among other things with more direct steps toward reducing poverty. The need to improve the role of agricultural productivity in poverty reduction appears to continue to gain more momentum now that it is recognized that one of the best means to meet the millennium development goals(MDGs) is in fact through making agricultural productivity and profitability more poor friendly(WB 2006).

The lesson: Under inequality, the fair trickle down assumption breaks down creating a bias distributive system in favor of dominant or well-off minorities. And this is consistent with the view that we should not expect poverty reduction programs to be

effective when inequality in access to income and assets is very prevalent and worsening as under those conditions benefits would accrue to the few(Addison and Cornia 2001). The need to pair growth and poverty reduction to bypass the failed expectation of the trickle down effect appears to be gaining momentum right now. For example, Dohlman and Soderback(2007) point outs that the Network on Poverty Reduction (POVNET/OECD) is now advocating and promoting a pro-poor, pro growth strategy geared at having immediate and sustained impacts on poverty reduction. And OECD(2006) indicates in a policy statement that pro-poor growth is needed to quickly address poverty issues in a sustained fashion. This pro-poor growth push may work better than the previous pro-growth approach only if it is paired with strong efforts to reduced existing inequalities as it was indicated above that increasing inequalities send increasing benefits toward the better off. This pairing of pro-poor growth and inequality reduction is very important now to ensure sustained and increasing poverty reduction as two of the main predictions made in a 2007 Report on the Global Economy are a) more global growth is coming; and b) more wealth disparities are coming(Stuart 2007). The IMF(2007), despite recent financial instability, also expects global economic growth to be strong in 2007 and 2008.

**The need to explain the theory-practice gap**

If the fair trickle down effect is not working, then what explains the theory-practice benefit distribution gap?. It is pointed out in this paper that what the author calls The Embudo Effect, not the trickle down effect, is the bias distributive mechanism responsible for explaining the constantly growing rich-poor gap.

**The goals of this paper**

The goals of this paper are to introduce an agricultural development model that is driven by the Embudo effect; to point out that under inequalities, the Embudo effect drives agricultural development benefits towards those better off; and to stress that only in the absence of the Embudo effect would the historically assumed trickle down effect work as expected and provide benefits to all involved.

**Terminology**

The terminology used to present the ideas in this paper is listed below:

Table 1

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E = Equality e = Inequality

B = Agricultural benefits S = Agricultural technology

G = Many people g = Few people

R = The rich P = The poor

A = Model under the Embudo effect a = Model without the Embudo effect

L = Equal access to resources exist l = Unequal access to resources exist

M = Equal access to markets exist m = Unequal access to markets exist

A1 = Embudo effect type 1 A2 = Embudo effect type 2

A3 = Embudo effect type 3 T = Trickle down effect

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**Methodology**

First, some operational rules governing the spread of benefits from agricultural improvements under equality and inequality conditions are listed to point out the structure of what the author calls The Bowl Effect and the Embudo Effect. Second, a general agricultural development Embudo effect model driven by unequal access to resources and/or markets is introduced. Third, this general model is then used to highlight possible partial, total, and neutral Embudo effects models and their general characteristics. Fourth, it is stressed that the expectations of the trickle down effect model are the same as those expectations of the neutral Embudo and of the bowl effect model. Fifth, it is indicated that the expectations of the trickle down effect model and therefore those of the bowl effect model are totally the opposite as the expectations of the full Embudo effect model. And finally, some relevant conclusions are listed.

**Operational rules:**

***i) Spreading agricultural technological(S) benefits(B) under equality(E)***

Benefits under equality[B(E)] resulting from agricultural technology improvements(S) should be expected to accrue to all enjoying this equality condition(G).

S

B(E) ----------→ G

For example, when there is equal access to resources(E) such as land, other things been equal, benefits(B) from agricultural technological progress(S) would be shared by all participants(G) as all would be able to implement agricultural innovations whether they are provided free or for a fee. This leads to what the author calls The bowl effect as shown in Figure 1 below:

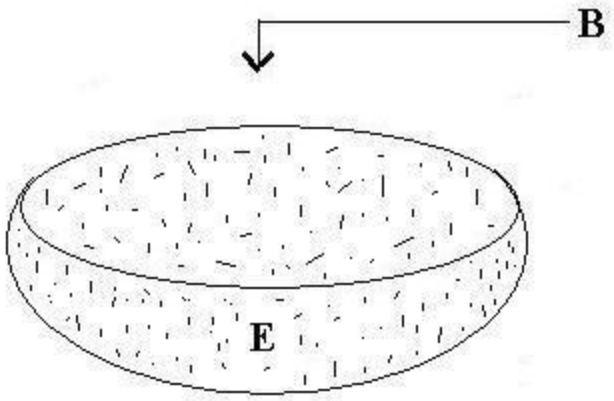


**Figure 1 The Bowl Effect: Under equality(E) benefits(B) from agricultural technological improvements(S) reach every party within the bowl.**

Figure 1 shows that under equality(E), agricultural technology(S) benefits(B) reach all those involved within the bowl, it links benefits(B) with notion of equality(E) in sharing. Notice that the expectation of the bowl effect is consistent with the expected result of the trickle down effect assumption mentioned in the introduction, meaning there are benefits for all involved to share.

***ii) Spreading technological(S) benefits(B) under inequality(e)***

Benefits under inequality[B(e)] resulting from agricultural technology improvements(S) should be expected to accrue to the few enjoying this inequality condition(g).

$$B(e) \xrightarrow{S} g$$

For example, when there is unequal access to resources(e) such as land, other things been equal, benefits(B) from agricultural technological progress(S) would go to only those, the few(g), with access to land as only they would be able to implement agricultural innovations whether they are provided free or for a fee. Those who have no land would not be able to use the technologies even if there are provided at free cost.

This tendency of benefits(B) to accrue mostly to those better off(R) when agricultural development is implemented under unequal access to resources(income, land, and other natural resources); unequal access to inputs(labour, capital, and new technology), and unequal access to markets(local, regional, national, and global) is what the author calls The Embudo or Cone Effect.

Embudo is the Spanish word for Cone. This Embudo Effect concept can be clearly appreciated from Figure 2 below:

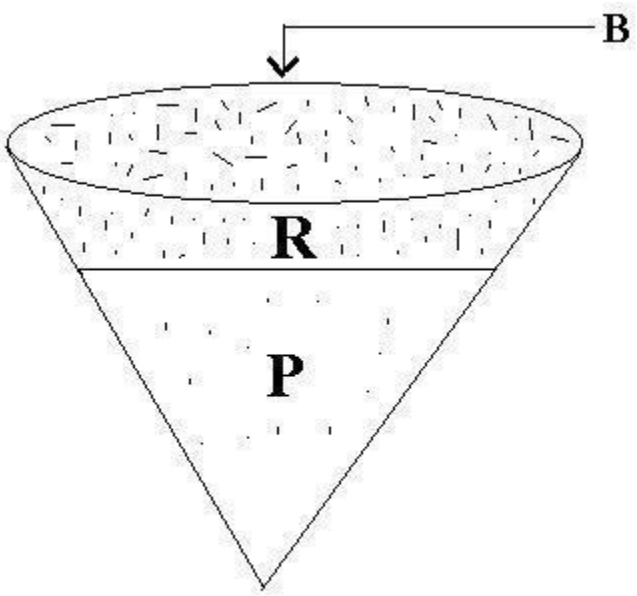


**Figure 2 The Embudo Effect: Agricultural developmet benefits(B) fall at the top of the cone, first filtered by the rich(R), then little or none reaching the poor(P).**

Notice that under inequality(e), the bowl in Figure 1 gets transformed into an Embudo or Cone in Figure 2.

Hence, Figure 2 shows that under inequality(e) we can picture a system shaped like an Embudo or cone, where the rich(R) are placed at the wide and shallow top; and the poor(P) are placed at the increasingly deeper and narrower bottom. Figure 2 links benefits(B) with inequality(e) in the sharing. See that when agricultural development benefits(B) are poured into the Embudo or Cone, most of them get filtered at the top and very little or none reach the bottom.

**The agricultural development Embudo effect model(A)**

There is an agricultural development Embudo effect model(A) when there is unequal access to resources(l) or when there is unequal assess to markets(m) or when there is unequal access to both resources(l) and markets at the same time(m), which can be expressed as follows.

1) $A = l + m$

**There are three possible Embudo effect models according to formula 1 above**

***i) Embudo effect under unequal access to resources***

The first possibility is when agricultural development(A) is implemented in an environment where there is deep inequality in access to resources(l) and where there is equality in access to markets (M) at the same time, which can be expressed as below:

2) A1 = lM

In this model A1, only those having access to resources will benefit from agricultural technological improvements as only they would be able to implement them and have additional production and/or better products to bring to the market. For example, those who have land(usually a minority) should be expected to implement the technological improvements, whether it is provided free or for a fee; and those who have no access to land(usually the majority) should be expected to be unable to implement new technologies even if they are offered for free. Hence, model A1 is a partial Embudo effect model driven by inequalities in access to resources.

***ii) Embudo effect under unequal access to markets***

The second possibility is when agricultural development(A) is implemented in an environment where there is equal access to resources(L) and where there is very unequal access to markets(m) at the same time, which is stated below:

3) A2 = Lm

According to model A2, only those resource owners having access to markets will benefit from agricultural technological improvements(usually a minority) as only they would have an incentive to implement them, whether it is provided free or for a fee since only they would be able to sell increased production and/or better products in those markets. Therefore, A2 is another type of partial Embudo effect model, but this one is driven by inequalities in access to markets.

***iii) Embudo effect under unequal access to resources and markets***

The third possibility is when agricultural development(A) is implemented in an environment where there is unequal access to resources(l) and where there is unequal access to markets(m) at the same time, which the author calls “the full Embudo or cone effect model”, as indicated below:

4) A3 = lm

Consistent with model A3, only those having access to resources(usually a minority) and access to markets(usually the same minority) at the same time will benefit from agricultural technological improvements as only they would have an incentive to implement them, whether it is provided free or for a fee since only they would be able to sell increased production and/or better products in those markets. Hence, model A3 is a full Embudo effect model as it is driven by inequalities in access to resources and in access to markets at the same time.

***iv) Agricultural development without Embudo effect(a)***

According to formula 1 above, there could be agricultural development without Embudo effect(a), but only when there is equal access to resources(L)and equal access to markets(M) at the same time. The author calls this situation, the Embudo effect neutral agricultural development model, which it is shown below.

5) a = LM

In the case of model "a" in formula 5, everybody having access to resources and to markets at the same time would benefits from agricultural technological improvements as all of them would be able to access markets to clear increased production and/or better products. Notice that the expectation expressed through model "a" is consistent with the expectation of trickle down effect model(T); and this is expressed below:

6) T = a = LM

Formula 6 shows that the expectations of the trickle down effect model(T) are the same as the expectations of the Embudo effect neutral agricultural development model(a) as both of them require the existence of equality in access to resources(L) and in access to markets(M) at the same time in order to be able to spread benefits from agricultural improvements to everybody involved.

Also notice that the implications of formula 6 are the same as the implications of The Bowl Effect pointed out in Figure 1 above as both of them require equality conditions in access to resources(L) and in access to markets(M) to reach all those involved, which is stressed below:

7) T = a = LM = The Bowl Effect

Finally, formula 7 helps us to appreciate clearly that under inequality conditions the expectations of the trickle down effect(T) and of the Bowl effect can not be materialized as both models clearly require the existent of equality in access to resources(L) and in access to markets(M) at the same time to be able to work as expected.

**Specific conclusions**

First, it was highlighted out that under equality conditions(E), the spreading of agricultural development benefits would be consistent with the bowl effect's expectations pointed out in Figure 1. Second, it was pointed out that under inequality conditions(e), the spreading of agricultural development benefits would be consistent with the expressed partial and total Embudo effect expectations. Third, it was indicated that that the expectations of the trickle down effect model(T) are the same as the expectations of the Embudo effect neutral agricultural development model(a), the need to have equality in access to resources(L) and to markets(M) at the same time. Fourth, it was stressed that both the expectations of the trickle down effect model(T) and of the Embudo effect neutral model(a) are the same as the expectations of the bowl effect model in Figure 1.

And finally, it was indicated that if we really want the trickle down effect assumption to hold we have to ensure that there is equality in access to resources and equality in access to markets at the same time when implementing agricultural development policies.

## General conclusions

It was pointed out that under equality conditions(E), the agricultural development model would trickle down as expected benefiting all involved, but under inequality conditions the trickle down assumption simply breaks down. In other words, since in practice agricultural development policies are implemented under deep inequality conditions both in access to resources and markets at the same time, then it is not possible to expect the trickle down expectations of benefits for all participants to hold. Then, implementing the agricultural development model under any type of Embudo effect will lead to a bias distributive mechanism towards the better off.

And this explains why despite constant improvements in agricultural technologies through the years leading to more growth, poverty and environmental degradation levels have been increasing; and why the Embudo effect provides a better explanation to the now well-known uneven agricultural benefit spreading process. Hence, only through dealing with deep inequalities in access to resources and markets at the same time can we create the conditions where agricultural growth will benefit all, including the poor.

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